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EXAMINER	
PHAM, HUNG Q	
ART UNIT	**PAPER NUMBER**
2172	6

DATE MAILED: 12/31/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PRL

Office Action Summary	Application No.	Applicant(s)
	09/825,013	MORIMOTO ET AL.
	Examiner	Art Unit
	HUNG Q PHAM	2172

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 October 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-23* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-23 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 1, 6, 12, 15 17, and 20-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claims 1, 6, 12, 15 17, and 20-23 the phrase ***such as*** renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Regarding claims 1 and 6, the phrase ***calculating a distance <u>from or</u> an orientation block*** renders the claim indefinite because it is unclear whether the limitations following the phrase are part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

7. Claims 1-10, 12, 15, 17, 20-21 and 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Koperski et al. [Spatial Data Mining: Progress and Challenges Survey paper].

Regarding to claims 1 and 20, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a

child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). In order to introduce spatial rules, a query is defined for examination as below (FIG. 3):

> *Extract characteristic rule from temperature map where province = "B.C" and period = "summer" and year = 1990 in relevance to region and temperature.*

As seen, any spatial object in the spatial database could be a starting point in a query, and the query as ***an objective function*** is to extract spatial rule. In other words, the technique as discussed indicates the step of ***providing from said database a starting point or a starting point group***; ***defining an objective function that is examined in order to introduce said spatial rules***. In order to process the query, all data described in the query are collected, and generalization can be performed on the spatial data by merging the spatial regions according to the description stored in the concept hierarchy. Generalization of the spatial objects continues until the spatial generalization threshold is reached. After the spatial generalization process, non-spatial data are retrieved and analyzed for each of the spatial objects using the attribute-oriented induction technique. In the above example query, temperature in the range [20, 27) is generalized to `moderate`, and temperature in the range [27, ∞) is generalized to `hot` (2.1 Generalization Based Knowledge Discovery, SPATIAL-DATA-DOMINANT GENERALIZATION). As seen, in order to clarify the characteristic rule from temperature map in the defined objective function, the separation between the different ranges of temperature or ***distance*** originating at B.C as the starting point is calculated by generalizing to `moderate` or `hot`. In different words, the generalization process

performs the step of ***calculating a distance or an orientation block originating at said starting point or said starting point group in order to optimize said objective function that is defined***.

Regarding to claim 2, Koperski teaches all the claimed subject matters as discussed in claim 1, Koperski further discloses ***objective function is a function for which a distance or an orientation requested by an analyzation business is not provided*** (Mining Spatial Data Deviation and Evolution Rules).

Regarding to claim 3, Koperski teaches all the claimed subject matters as discussed in claim 1, Koperski further discloses the step of ***entering as input parameters the definition of a distance, the definition of said starting point or said starting point group and the definition of said objective function*** (FIG. 3-4 and Algorithm for Multiple Level Spatial Association Rules).

Regarding to claim 4, Koperski teaches all the claimed subject matters as discussed in claim 1, Koperski further discloses ***an intermediate table is generated based on starting point set data consisting of said starting point group and said objective function, and in accordance with distance values, attribute values for query points in said database are added together, based on said intermediate table*** (Algorithm for Multiple Level Spatial Association Rules, *Coarse_predicate_DB*).

Regarding to claim 5, Koperski teaches all the claimed subject matters as discussed in claim 1, Koperski further discloses the step of ***displaying on a map said distance or said orientation block relative to said starting point or said starting point group*** (FIG. 3-4).

Regarding to claims 6, 21 and 23, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). In order to introduce spatial rules, a query as an objective function is defined for examination (FIG. 3):

> *Extract characteristic rule from temperature map where province = "B.C" and period = "summer" and year = 1990 in relevance to region and temperature.*

As seen, any spatial object in the spatial database could be a starting point in a query; a node of R-tree represents a spatial object in spatial database to represent the arrangement of spatial objects. In other words, the technique as discussed indicates the step of ***providing from said database a starting point or a starting point group***; ***employing said starting point or said starting point group to define an orientation***; and the query is to ***define an objective function that is examined in order to introduce said spatial rules***. In order to process the query, all data described in the query are collected, and generalization can be performed on the spatial data by merging the spatial regions according to the description stored in the concept hierarchy. Generalization of the spatial objects continues until the spatial generalization threshold is reached. After the spatial generalization process, non-spatial data are retrieved and analyzed for each of the spatial objects using the attribute-oriented induction technique. In the above example query, temperature in the range [20, 27) is generalized to *moderate*, and temperature in the range [27, ∞) is generalized to *hot* (2.1 Generalization Based Knowledge Discovery, SPATIAL-DATA-DOMINANT GENERALIZATION). As seen, in order to clarify the characteristic rule from temperature map in the defined objective function, the separation between the different ranges of temperature or distance originating at B.C as the starting point is calculated by generalizing to *moderate* and *hot*. In different words, the generalization process performs the step of ***calculating a distance or an orientation block originating at said starting point or said starting point group in order to optimize said objective function that is defined***.

Regarding to claim 7, Koperski teaches all the claimed subject matters as discussed in claim 6, Koperski further discloses ***objective function is a function for which a distance or an orientation requested by an analyzation business is not provided*** (Mining Spatial Data Deviation and Evolution Rules).

Regarding to claim 8, Koperski teaches all the claimed subject matters as discussed in claim 6, Koperski further discloses ***orientation block is obtained by employing the numerical value of said orientation used to optimize said objective function*** (FIG. 3-4).

Regarding to claim 9, Koperski teaches all the claimed subject matters as discussed in claim 6, Koperski further discloses ***a search objective data range, at equal distances from said starting point and from said starting point group, that is appropriate for calculating an orientation is selected as said orientation block*** (FIG. 3-4 and Algorithm for Multiple Level Spatial Association Rules).

Regarding to claim 10, Koperski teaches all the claimed subject matters as discussed in claim 6, Koperski further discloses the step of ***displaying on a map said distance or said orientation block relative to said starting point or said starting point group*** (FIG. 3-4).

Regarding to claim 12, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects

that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). The mining process is started by a query, which is to describe a class of objects *S* using other task relevant classes of objects, and a set of relevant relations. For example, a user may want to describe parks by presenting the description of relations between parks and other objects like: railways, restaurants, zoos, hydrological objects, recreational objects, and roads. Furthermore, the user can state that he/she is interested only in objects in the distance less than one kilometer from a park as the step of ***inputting of an objective function required for the optimization of a distance***. The first step of the algorithm collects the task-relevant data. Then, some efficient spatial computations are performed to extract spatial associations at the level of generalized spatial relations. These efficient computations look for objects whose minimal bounding rectangles are located in the distance no greater than the threshold to satisfy the *close_to* predicate. The generalized *g_close_to* predicates are

stored in an extended relational database *Coarse_predicate_DB*. Every row of the *Coarse_predicate_DB* is a description of a single object from the class of objects being described. Description consists of objects, which satisfy task relevant predicates. For example, a row related to Stanley Park in Vancouver may include restaurant, zoo, main road, inlet, lake and other objects located inside the park or close to it (Algorithm for Multiple Level Spatial Association Rules). In other words, this technique indicates the steps of ***employing in said database starting point data and query point data for calculating the distances between each starting point and each query point and generating an intermediate table***. Each predicate in *Coarse_predicate_DB* is checked with the threshold for the top level to filter out task-relevant classes of objects in the *g_close_to* predicates, which do not promise getting large predicates. For example, if only 5% of objects from class *S* satisfy the predicate *g_close_to(s, zoo)* and the minimum support threshold on the top level is 15% then the predicates *g_close_to(s, zoo)* will be deleted. This database is further processed using finer spatial computations to produce *Fine_predicate_DB*. In the *Fine_predicate_DB*, generalized predicates like *g_close_to* are changed into exact spatial predicates like *adjacent_to, intersects,* or *distance_less_than_x* (Algorithm for Multiple Level Spatial Association Rules) as the step of ***calculating a distance, based on said intermediate table, in order to optimize the value of said objective function that is entered***.

Regarding to claim 15, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects

that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). The mining process is started by a query, which is to describe a class of objects *S* using other task relevant classes of objects, and a set of relevant relations. For example, a user may want to describe parks by presenting the description of relations between parks and other objects like: railways, restaurants, zoos, hydrological objects, recreational objects, and roads. Furthermore, the user can state that he/she is interested only in objects in the distance less than one kilometer from a park as the step of ***inputting of an objective function required for the optimization of an orientation***. The first step of the algorithm collects the task-relevant data. Then, some efficient spatial computations are performed to extract spatial associations at the level of generalized spatial relations. These efficient computations look for objects whose minimal bounding rectangles are located in the distance no greater than the threshold to satisfy the *close_to* predicate (Algorithm for Multiple Level

Spatial Association Rules). Koperski further discloses spatial orientations like *left_of, west_of* predicates also include in the method (2.3 Methods Exploring Spatial Associations). The generalized *g_close_to* predicates are stored in an extended relational database *Coarse_predicate_DB*. Every row of the *Coarse_predicate_DB* is a description of a single object from the class of objects being described. Description consists of objects, which satisfy task relevant predicates. For example, a row related to Stanley Park in Vancouver may include restaurant, zoo, main road, inlet, lake and other objects located inside the park or close to it (Algorithm for Multiple Level Spatial Association Rules). As seen, ***based on starting point data and query point data in database***, *left_of,* or *west_of* predicates as ***angles of 0 degrees from said starting points in a specific direction are employed to generate*** Coarse_predicate_DB as ***an intermediated table in which the orientation of the location of said query points are included***. Each predicate in *Coarse_predicate_DB* is checked with the threshold for the top level to filter out task-relevant classes of objects in the *g_close_to* predicates, which do not promise getting large predicates. For example, if only 5% of objects from class *S* satisfy the predicate *g_close_to(s, zoo)* and the minimum support threshold on the top level is 15% then the predicates *g_close_to(s, zoo)* will be deleted. This database is further processed using finer spatial computations to produce *Fine_predicate_DB*. In the *Fine_predicate_DB*, generalized predicates like *g_close_to* are changed into exact spatial predicates like *adjacent_to, intersects,* or *distance_less_than_x* (Algorithm for Multiple Level Spatial Association Rules) as the step of ***calculating, based on said intermediate table, an orientation for optimizing the value of said objective function that is entered.***

Regarding to claim 17, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). In order to introduce spatial rules, a query as an objective function is defined for examination (FIG. 3):

> *Extract characteristic rule from temperature map where province = "B.C" and period = "summer" and year = 1990 in relevance to region and temperature.*

As seen, any spatial object in the spatial database could be ***a starting point*** in a query, and if a particular spatial object is a starting points, the others are ***query points***, and the query as discussed indicates ***the input of an objective function for which a distance or an orientation requested by an analyzation business is not provided***. In order to process the query, all data described in the query are collected, and generalization can be

performed on the spatial data by merging the spatial regions according to the description stored in the concept hierarchy. Generalization of the spatial objects continues until the spatial generalization threshold is reached. After the spatial generalization process, non-spatial data are retrieved and analyzed for each of the spatial objects using the attribute-oriented induction technique. In the above example query, temperature in the range [20, 27) is generalized to `moderate`, and temperature in the range [27, ∞) is generalized to `hot` (2.1 Generalization Based Knowledge Discovery, SPATIAL-DATA-DOMINANT GENERALIZATION). Koperski further discloses the predicates of a query are stored in an extended relational database *Coarse_predicate_DB*. Each predicate in *Coarse_predicate_DB* is checked with the threshold for the top level to filter out task-relevant classes of objects. For example, if only 5% of objects from class *S* satisfy the predicate *g_close_to(s, zoo)* and the minimum support threshold on the top level is 15% then the predicates *g_close_to(s, zoo)* will be deleted. This database is further processed using finer spatial computations to produce *Fine_predicate_DB* (Algorithm for Multiple Level Spatial Association Rules). As seen, in order to clarify the characteristic rule from temperature map in the defined objective function, spatial data includes ***starting point data*** and ***query point data*** are employed, the separation between the different ranges of temperature or distance originating at B.C as the starting point is calculated by generalizing to `moderate` , or `hot` via the *Coarse_predicate_DB* in the first step of calculation, and filtered in the second step of calculation to have the *Fine_predicate_DB* . In different words, the generalization process performs the step of ***employing starting point data and query point***

data in said database for calculating a distance between, or the orientation of each of the starting points with each of the query points, and calculating said optimal distance or said optimal orientation for the optimization of the value of said objective function. And as in FIG. 3 and 4 is the step of ***displaying, on the screen of a geographical information system, said optimal distance or said optimal orientation calculated by said optimal distance/orientation calculation means.***

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claims 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koperski et al. [Spatial Data Mining: Progress and Challenges Survey paper].

Regarding to claims 11 and 22, Koperski teaches a spatial data mining method to discover interesting knowledge from spatial data, which are the data related to objects that occupy space. The spatial objects are stored in a spatial database and represented by spatial data types and spatial relationships among such objects. Spatial data carries topological and/or distance information and it is often organized by spatial indexing structures and accessed by spatial access methods (Introduction). Algorithms for spatial data mining involve spatial data structure, which consists of points, lines, rectangles, etc. In order to build indices for these data, R-tree has been proposed. Objects are stored in R-trees and approximated by Minimum Bounding Rectangles (MBR). At the leaves there are stored pointers to representation of polygon's boundaries and polygon's MBRs. At the internal nodes each rectangle is associated with a pointer to a child and represents minimum bounding rectangle of all rectangles stored in the child (1.1.2 Spatial data structure, computations, and queries). As seen, any spatial object in the spatial database could be a starting point in a query, and if a particular spatial object is a set of starting points, the other is a set of query points. In other words, the technique as discussed indicates the step of ***providing a set of starting point and a set of query point in a database***. The mining process is started by a query, which is to describe a class of objects *S* using other task relevant classes of objects, and a set of relevant

relations. For example, a user may want to describe parks by presenting the description of relations between parks and other objects like: railways, restaurants, zoos, hydrological objects, recreational objects, and roads. Furthermore, the user can state that he/she is interested only in objects in the distance less than one kilometer from a park as the step of ***designating an upper limit for a distance between said set of starting points and said set of query points***. The first step of the algorithm collects the task-relevant data. Then, some efficient spatial computations are performed to extract spatial associations at the level of generalized spatial relations. These efficient computations look for objects whose minimal bounding rectangles are located in the distance no greater than the threshold to satisfy the *close_to* predicate (Algorithm for Multiple Level Spatial Association Rules) as the step of ***calculating a distance between each starting point and each query point***. Koperski further discloses spatial orientations like *left_of, west_of* predicates also include in the method (2.3 Methods Exploring Spatial Associations). Thus, an angle computations will perform on objects that satisfy the *close_to* predicate, or in other words, ***calculating an angle formed between a starting point and a query point whose distance from said starting point does not exceed said designated upper limit***. Koperski does not teach the step of ***generating a data table using said angle formed with said starting point***. However, as taught by Koperski, the generalized *g_close_to* predicates are stored in an extended relational database *Coarse_predicate_DB*. Every row of the *Coarse_predicate_DB* is a description of a single object from the class of objects being described. Description consists of objects, which satisfy task relevant predicates. For example, a row related to Stanley Park in Vancouver may include restaurant, zoo, main

road, inlet, lake and other objects located inside the park or close to it (Algorithm for Multiple Level Spatial Association Rules). As seen, a data table is generated based on the *close_to* predicate corresponding to the starting point, and obviously, a data table based on an angle formed with starting point such as *left_of, west_of* could be generated according to a specified query such as a query only in objects in the distance less than one kilometer and to the west from a park. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski method by using spatial orientation to generate data table in the extended relational database *Coarse_predicate_DB* in order to extract spatial rules that relate to a direction.

10. Claims 13 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koperski et al. [Spatial Data Mining: Progress and Challenges Survey paper] in view of Ester et al. [Clustering for Mining in Large Spatial Databases].

Regarding to claim 13, Koperski teaches all the claimed subject matters as discussed in claim 12, Koperski further discloses the step of ***employing query point data in said database to calculate distances between individual starting points and individual query points and to generate data records; and selecting an optimization function from among objective functions to be examined, and adding together record values, collected from said data records, that are required for optimization of each of said distances*** (Algorithm for

Multiple Level Spatial Association Rules). Koperski fails to teach the step of ***preparing a Voronoi diagram by using said starting point data in said database***; and ***employing said Voronoi diagram*** to calculate distance. Ester teaches the technique of using voronoi diagram for spatial data mining technique (Clustering for Mining in Large Spatial Databases). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski apparatus by using voronoi diagram to calculate distance in order to cluster data in a spatial database.

Regarding to claim 16, Koperski teaches all the claimed subject matters as discussed in claim 15, Koperski further discloses the step of ***employing query point data in said database to calculate distances between individual starting points and individual query points; calculating, based on said distances obtained, orientations of said starting points with said query points that fall within a designated distance upper limit, and storing said orientations as data records for said intermediate table; and selecting an optimization function from among objective functions to be examined, and collecting and adding record values, from said data records, that are required for optimization of each of said distances*** (Algorithm for Multiple Level Spatial Association Rules). Koperski does not teach the step of ***preparing a Voronoi diagram by using said starting point data in said database***; and ***employing said Voronoi diagram*** to calculate the distances. Ester teaches the technique of using voronoi diagram for spatial data mining technique (Clustering for Mining in Large Spatial Databases). Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski apparatus by

using voronoi diagram to calculate distance in order to cluster data in a spatial database.

11. Claims 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Koperski et al. [Spatial Data Mining: Progress and Challenges Survey paper] in view of Knorr et al. [Finding Aggregate Proximity Relationships and Commonalities in Spatial Data Mining].

Regarding to claim 18, Koperski teaches all the claimed subject matters as discussed in claim 17, but fails to disclose the step of ***using said optimal distance calculated for the display of circular areas, the centers of which are starting points***. Knorr teaches the technique of using circles and rectangles for displaying the features of spatial data. Therefore, it would have been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski technique by using circular areas to display the starting point in order to distinguish spatial information.

Regarding to claim 19, Koperski teaches all the claimed subject matters as discussed in claim 17, but fails to disclose the step of ***using said optimal orientation for the display of fan-shaped portions of said circular areas, the origins of said fan-shaped portions being said starting points at said centers of said circular areas***. Knorr teaches the technique of using circles and rectangles for displaying the features of spatial data. Krorr further discloses a feature can be any simple polygon. Therefore, it would have

been obvious for one of ordinary skill in the art at the time the invention was made to modify the Koperski technique by using a fan-shaped portion of circular areas to display the starting point in order to distinguish spatial information.

Allowable Subject Matter

12. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The closet available prior arts, Spatial Data Mining: Progress and Challenges Survey paper published by Koperski et al. in combined with the technique of of Ester et al. (Clustering for Mining in Large Spatial Databases) also teaches a spatial dat mining apparatus for calculating an optimal distance. However, Koperski and Ester fail to teach or suggest the technique of ***repeating plane quarter division in accordance with the number of starting points that are entered, sorts said starting points into end plane pixels obtained by division and selects one starting point in each of said end plane pixels as a representative point for the pertinent pixel, prepares a quaternary incremental tree with pixels at individual levels being defined as intermediate nodes, scans said individual nodes of said quaternary incremental tree in the breadth-first order, beginning at the topmost level, and outputs a set of starting points that are positioned in ranks.***

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q PHAM whose telephone number is 703-605-4242. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, JOHN E BREENE can be reached on 703-305-9790. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-3900.

Examiner Hung Pham
December 22, 2003

SHAHID ALAM
PRIMARY EXAMINER